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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/945,306	08/30/2001	Jian Dong	091-0110	2047

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EXAMINER

BRODA, SAMUEL

ART UNIT	PAPER NUMBER
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2123

DATE MAILED: 02/10/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	09/945,306	DONG ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Samuel Broda	2123	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

**A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.**

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 30 August 2001.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) 11-16 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10 and 17-26 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☒ Claim(s) 1-26 are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 August 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

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### **DETAILED ACTION**

1. Claims 1-10 and 17-26, subject to the restriction requirement described below, have been examined.

#### ***Election/Restriction***

2. As the claims are presented, restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-10 and 17-26, drawn to a method and systems for design optimization incorporating a multi-disciplinary module, classified in class 703, subclass 1.
- II. Claims 11-16, drawn to a method for performing a single-discipline design optimization using simulation code input and output files, classified in class 703, subclass 22.

2.1 Inventions I-II are related as combination and subcombination. Inventions in this relationship are distinct if it can be shown that (1) the combination as claimed does not require the particulars of the subcombination as claimed for patentability, and (2) that the subcombination has utility by itself or in other combinations (MPEP § 806.05(c)).

In the instant case, the combination as claimed does not require the particulars of the subcombination as claimed because the combination does not require a particular module design.

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The subcombination of Group II has separate utility such as the automatic evaluation of simulation output based on simulation input, thereby facilitating the faster performance of simulations.

**2.2** Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification and/or recognized divergent subject matter, restriction for examination purposes as indicated is proper.

**2.3** On 31 January 2005, the Examiner telephoned Applicants' attorney Mr. Michael Shimokaji, Reg. No. 32,303, regarding an election/restriction requirement. Mr. Shimokaji attorney agreed to elect claims 1-10 and 17-26 without traverse. Applicants are requested to formally cancel claims 11-16 as part of any response to this office action.

### ***Drawings***

**3.** Applicants' formal drawings have been reviewed and approved.

### ***Claim Rejections - 35 U.S.C. § 112, Second Paragraph***

**4.** The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

**4.1** Claims 17-26 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential elements, such omission amounting to a gap between the

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elements. See MPEP § 2172.01. The omitted elements are the computer hardware components necessary to operate the software “modules” to form the “system” of each claim.

***Claim Rejections - 35 U.S.C. § 101***

5. The following is a quotation of 35 U.S.C. 101:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5.1 Method claims 1-10 are rejected for reciting a process that is not directed to the technological arts. The language of each claim raises a question as to whether the claim is directed merely to an abstract idea that is not tied to a technological art, environment, or machine which would result in a practical application producing a concrete, useful, and tangible result to form the basis of statutory subject matter under 35 U.S.C. 101.

In each of claims 1-10, the method steps appear achievable by a person using mental steps or pencil and paper.

5.2 System claims 17-26 are rejected for reciting a machine that appears to be implemented in software alone, thus not being tangible and forming the basis of statutory subject matter under 35 U.S.C. 101.

In each of claims 17-26, the system is claimed in terms of “modules.” As defined in the Specification at page 10 line 23 through page 11 line 20, each module appears to comprise

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software components alone. Absent the computer hardware necessary to operate the modules, the system claims appear incomplete and thus not tangible under Section 101.

***Claim Rejections - 35 U.S.C. § 102***

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

...

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6.1 Claims 1-8, 17-23, and 26 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Padula et al, "Multidisciplinary Optimization Branch Experience Using iSIGHT Software," National Aeronautics and Space Administration Report TM-1999-209714, pp. 1-19 (November 1999).

6.2 Regarding claims 1-8, 17-23, and 26, Padula et al teaches use of the "iSIGHT" software system for integrating a set of single-disciplinary modules for performing system level optimization for the following applications: launch vehicle sizing, aerospike nozzle design, trajectory optimization, and acoustic liner research. See "Aerospace Applications of iSIGHT" at pages 3-8; see also Fig. 3 displaying the integration of two simulation code blocks to perform the launch vehicle sizing optimization. According to Padula et al at page 6 paragraph 2:

Although the aerospike implementation is not yet complete, the iSIGHT framework has many obvious advantages for solving large MDO problems. It

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provides a method for connecting several simulation codes together without changing any of the codes. Unlike the iSIGHT framework implementation, the original approach to the aerospike nozzle implementation, where one large program is defined, does not lend itself to experimenting with the single discipline analyses and optimizations, nor the integrated analysis and optimization. Not only does this iSIGHT framework feature make it quick and easy for the system developer; it also aids the disciplinary experts who need to run their codes in stand-alone mode as well as integrated into the system.

The features of iSIGHT described in the optimization implementation taught by Padula et al correspond to the method and system claims 1-8, 17-23, and 26.

***Claim Rejections - 35 U.S.C. § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7.1 Claims 9-10 and 24-25 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Padula et al, in view of Amundsen et al, "Preliminary Thermal Analysis of a Mars Sample Return Earth Entry Vehicle," American Institute of Aeronautics and Astronautics, AIAA-2000-2584, pp. 1-10 (2000).

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7.2 Regarding claims 9-10 and 24-25, Padula et al does not appear to explicitly teach optimization using thermal analysis and TPS thickness analysis modules. However, Amundsen et al describes the separation of thermal models into four phases corresponding to cruise with the spacecraft, post-separation exo-atmospheric cruise, atmospheric entry to landing, and post-landing. Amundsen et al at page 3 column 1 paragraph 3. Further according to Amundsen et al at page 2 column 1 paragraph 2:

The thermal analysis results are valuable for several reasons. First, the thermal environment experienced by the returned samples can be predicted, and if not acceptable for science reasons, design modifications can be made. The thermal history of each material in the vehicle design can also be compared to its survival range, to ensure that all designed materials are adequate. The thermal predictions for operational mechanical and electronic components can be used to ensure they remain within their acceptable thermal range. Another use for the thermal predictions is to predict thermal stresses and deflections in the vehicle. The exo-atmospheric phases involve cold temperatures and slow changes, as well as a moderate gradient across the vehicle. The entry phase involves very rapid changes in temperature and gradients across the vehicle. Each thermal case can be used for structural analysis of the vehicle, to determine if unacceptable stresses or deflections are encountered.

Regarding claims 9-10 and 24-25, it would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to have modified the system of Padula et al to incorporate the thermal analysis models of Amundsen et al, because the resulting system would



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combine the thermal analyses with the structural analyses and permit the modeling of each of the distinct thermal phases an earth entry vehicle would encounter.

### *Conclusion*

8. The prior art made of record and not relied upon is considered pertinent to Applicants' disclosure. Reference to Parson, U. S. Patent 6,053,947 is cited as teaching a simulation model using object oriented programming that includes use of wrappers.

Reference to Chen et al, "Integrated Electrical and Thermal Analysis of Integrated Power Electronics Modules Using iSIGHT," 16<sup>th</sup> Annual IEEE Applied Power Electronics Conference and Exposition, Vol. 2, pp. 1002-1006 (March 2001), is cited as teaching design of a power module using iSIGHT to incorporate modules for parasitic inductance and capacitance, power loss, and thermal analysis.

Reference to Korte, "Parametric Model of an Aerospike Rocket Engine," American Institute of Aeronautics and Astronautics, AIAA-2000-1044, pp. 1-9 (2000), is cited as teaching parametric engine geometry incorporated into the iSIGHT multidisciplinary framework.

9. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Samuel Broda, whose telephone number is (571) 272-3709. The Examiner can normally be reached on Mondays through Fridays from 8:00 AM – 4:30 PM.

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If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Kevin Teska, can be reached at (571) 272-3716. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the group receptionist, whose telephone number is (571) 272-2100.



**SAMUEL BRODA, ESQ.**  
**PRIMARY EXAMINER**